



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

D. COMMEREUC et al.

Examiner: J. Pasterczyk

Serial No.: 09/580,179

Group Art Unit: 1755

Filed: May 26, 2000

Title: CATALYTIC COMPOSITION AND ITS APPLICATION TO OLEFIN
OLIGOMERIZATION

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BRIEF ON APPEAL

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Advisory Action dated May 12, 2003, please amend the above-identified application as follows:

Real Party in Interest

The real party in interest in this application is Institut Français du Pétrole, by means of an assignment recorded at reel 011009, frame 0475.

Related Appeals and Interferences

There are no known related appeals or interferences.

Status of Claims

Claims 1, 3-11 and 17-21 are pending, and on appeal. Claims 12-16 have been

withdrawn by the Examiner. Claim 2 has been cancelled.

Status of Amendments

Applicants' Amendment After Final, filed April 30, 2003, has been entered. See item 7 of the Advisory Action mailed May 12, 2003.

Summary of Invention

The present invention is directed to a catalyst composition comprising (a) at least one divalent nickel compound of the formula $(R_1COO)_2Ni$, wherein R_1 is alkyl, cycloalkyl, alkenyl, aryl, aralkyl or alkaryl of up to 20 carbon atoms; (b) at least one hydrocarbylaluminum dihalide of the formula $AlRX_2$, wherein R is hydrocarbyl of 1 to 12 carbon atoms and X is chlorine or bromine; and (c) at least one Brönsted acid; said composition being preconditioned in a solvent. See Appellants' specification at page 1, line 27 through page 2, line 4. Preferred preconditioning takes place at a temperature of 0-80° C, for a period of 1 minute to 5 hours. See Appellants' specification at page 3, lines 20-23.

Issues

The only issue for consideration in this Appeal is the rejection of all pending, non-withdrawn claims under 35 U.S.C §103. It is noted that the prior rejection under §112, second paragraph, has been withdrawn (see item 3 of the Advisory Action of May 12, 2003).

Grouping of Claims

Separate consideration is respectfully requested for claims 1 and 3-11, apart from claim 21. Moreover, separate consideration is requested for claims 6 and 19. Reasons for separate patentability of both groups of claims is given below.

Argument

Claims 1, 3-11 and 17-21 remain rejected under 35 U.S.C §103 over Chauvin, et. al. '305 (referred to in the Final Rejection as "Chauvin II") taken with Chauvin, et. al. '571 (referred to in

the Final Rejection as "Chauvin I").

Chauvin II discloses a catalyst which is a combination of bivalent nickel, and aluminum hydrocarbonyl halide and a Brönsted acid. Although the Office Action argues that this patent discloses the invention "essentially as claimed," as the Office Action admits, this patent does not disclose mixing of the catalyst components for any particular time or any particular temperature. Moreover, the patent does not disclose "pre-conditioning" of these components in a solvent, as in claim 21. In particular, Chauvin II teaches either addition of the separate catalyst components and the feed simultaneously or, if weight is given to order of the recitation of these components in the examples, the patent teaches addition of the catalyst components subsequent to commencement of the feed. Example No. 2 (relying on comparative example No. 1) at column 3 of the patent teaches that "there is introduced a C₃ cut ... dichloro-ethyl aluminum as a solution in isooctane and ... a C₉ - C₁₃ nickel carboxylate having a 10% metal content, as a solution in isooctane." Similar language is found in comparative example 3, and examples 4 and 5, at column 4 of the patent. Example #13 perhaps suggests that the catalyst solutions are introduced subsequent to the liquid mixture of feed, note lines 29-35 of column 5 of the patent. Thus, it is submitted that "preconditioning", in which the catalyst is aged in a solvent prior to commencement of the reaction, contacting the nickel compound, organic Brönsted acid and hydrocarbonylaluminum and dihalide in a solvent *before* employing the catalyst for oligomerization, see the sentence bridging pages 1 and 2 of the specification, is simply not taught by this disclosure.

The Advisory Action of May 12, 2003 argues that "pre-conditioning in a solvent" means "nothing more than allowing the reaction to proceed to completion." It is not entirely clear what "reaction" is referred to herein, but presumably it is *not* the oligomerization reaction with the hydrocarbon feed, since this reaction does not "pre-condition" the catalyst, in as much as the term is defined in the present specification as a combination of the catalyst components *prior* to commencement of any reaction therewith. Thus, it is assumed that this sentence in item 5 of the Advisory Action refers to mixing the catalyst components in solvent, and allowing "reaction" of the components with each other in the solvent to occur, before commencing the reaction. Thus, this sentence places the conclusion before the reasoning. In fact, such pre-conditioning is not

"something the routiner in the art would have recognized as advantageous in its own right" without some suggestion thereof in the art. It is this very suggestion which is lacking in the rejection, in as much as, as discussed above, Chauvin II shows introduction of the separate catalyst components and the feed simultaneously and/or subsequent introduction of the catalyst components after commencement of the feed. Thus, Chauvin I does not encompass or teach pre-conditioning, and there is no support for the assertion that such pre-conditioning would be obvious. Whether one of ordinary skill in the art might find it obvious to allow reaction of catalyst components to completion, once combined, is not the question. Rather, first, it must be asked *why* one of ordinary skill in the art would find it obvious to combine the components, prior to commencement of the reaction. This issue has simply not been addressed in the Advisory Action by this sentence.

To the extent that the issue is, in fact, addressed in the Final Rejection, it is argued therein that pre-conditioning is taught by Chauvin I, which is argued to disclose overlapping reaction times and temperatures with the embodiment of the process recited in claim 1. Appellants respectfully disagree with this analysis.

Chauvin I is directed to a catalyst composition comprising a nickel component, an aluminum hydrocarbyl halide and an epoxy compound. Patentees teach, at col. 1, lines 42-45, that "if at least one divalent nickel compound is placed into contact with at least one hydrocarbylaluminum halide and at least one epoxy compound, this will lead to a catalytic composition more active than prior art formulations." Thus, the catalysts of these two patents are fundamentally different, one containing a Bronsted acid and one containing an epoxy compound.

Chauvin I teaches that the epoxy compound plays a role in the production of the "more active" catalytic composition, as noted above. Thus, this patent can teach nothing with respect to the preparation of the wholly different catalyst of Chauvin II, which contains a Bronsted acid. Indeed, the argument at page 3 of the Office Action that "[a]ll that appears to occur in the present invention is the recognition that it takes some time for the nickel catalyst to become fully activated by the aluminum co-catalyst," is an overstatement in that it neglects Chauvin I tying the presence of the epoxy compound into the reaction. On information and belief, the mixing step in Chauvin I serves to entail a reaction between the nickel compound and the epoxy compound.

Thus, no generalization from this disclosure can be made to the different catalysts of the primary reference.

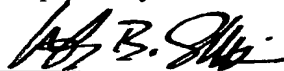
It is accordingly submitted that the combination of references fails to establish even a *prima facie* case of obviousness, in view of the different nature of the catalysts therein. The primary reference teaches introduction of the catalyst in a manner which precludes pre-conditioning. One of ordinary skill in the art simply has no motivation to generalize the secondary reference's mixing step to production of a different catalyst.

Moreover, it is submitted that the example and comparative examples of the present specification provide further evidence of the non-obviousness of such combination. In the examples, a catalyst prepared without pre-conditioning as in the present claims (comparative Example 1) is compared to a catalyst pre-conditioned in accordance with the claims (Examples 2 and 3). It is shown, in oligomerization the processes in the examples, that significantly improved conversion is obtained with the pre-conditioned catalyst in accordance with the invention. It is respectfully submitted that this provides further basis for the patentability of the present invention.

Accordingly, it is submitted that ample basis to overturn the rejection exists, and the same is respectfully requested.

The Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Respectfully submitted,



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APPENDIX

Claim 1: A catalytic composition, comprising a product resulting from bringing the following three constituents into contact in any order:

- a) a least one divalent nickel compound of the formula



where R_1 is an alkyl, cycloalkyl, alkenyl, aryl, aralkyl or alkaryl radical containing up to 20 carbon atoms;

- b) at least one hydrocarbylaluminum dihalide with formula AlRX_2 , where R is a hydrocarbyl radical containing 1 to 12 carbon atoms and X is a chlorine or bromine atom; and

- c) at least one organic Bronsted acid;

the mixture obtained being pre-conditioned in a solvent, in an inert atmosphere at a temperature of 0 to 80°C, for 1 minute to 5 hours, prior to use as a catalyst.

Claim 3: A catalytic composition according to claim 1 wherein the pK_a of said organic Bronsted acid is a maximum of 3 at 20°C and is a halogenocarboxylic acid of the formula R_2COOH where R_2 is a halogenated alkyl radical.

Claim 4: A catalytic composition according to claim 3 wherein said organic Bronsted acid is a halogenoacetic acid of formula $\text{CX}_p\text{H}_{3-p}\text{-COOH}$ where X is fluorine, chlorine, bromine or iodine, and p is a whole number from 1 to 3.

Claim 5: A catalytic composition according to claim 4, wherein said organic Bronsted acid is trifluoroacetic acid, trichloroacetic acid or tribromoacetic acid.

Claim 6: A catalytic composition according to claim 21, wherein the preconditioning comprises mixing the three constituents in a hydrocarbon or halogenohydrocarbon solvent with stirring and in an inert atmosphere at a controlled temperature

of 0°C to 80°C and for a duration of 1 minute to 5 hours.

Claim 7: A catalytic composition according to claim 1, wherein the mole ratio of said hydrocarbylaluminum dihalide to said nickel compound, expressed as the Al/Ni ratio, is 2/1 to 50/1, and the mole ratio of said Bronsted acid to said nickel compound is 0.25/1 to 10/1.

Claim 8: A catalytic composition according to claim 1 wherein said hydrocarbylaluminum dihalide contains an aluminum trihalide, the mixture of these two compounds having formula AlR_nX_{3-n} , R and X being as defined in claim 1 and where n is a number between 0 and 1.

Claim 9: A catalytic composition according to claim 8, wherein the mole ratio between said hydrocarbylaluminium dihalide mixed with an aluminium trihalide and the nickel compound, expressed as the ratio Al/Ni, is 2/1 to 50/1, and the mole ratio of the Bronsted acid to the nickel compound is 0.25/1 to 10/1.

Claim 10: A catalytic composition according to claim 8, wherein said hydrocarbylaluminium dihalide mixed with an aluminium trihalide is obtained by mixing a hydrocarbylaluminium dihalide with formula $AlRX_2$ with an aluminium trihalide AlX_3 .

Claim 11: A catalytic composition according to claim 8, wherein said hydrocarbylaluminium dihalide mixed with an aluminium trihalide is obtained by mixing dichloroethylaluminium with aluminium trichloride.

Claim 12: A process for dimerization or oligomerization of at least one monoolefin, comprising contacting said monoolefin with a catalytic composition according to claim 1.

Claim 13: A process according to claim 12, wherein the pre-conditioning solvent for the catalytic composition comprises a mixture of olefins having a composition approximating that of the mixtures obtained by said dimerization or oligomerization reaction.

Claim 14: A process according to claim 12, in which the propylene is dimerized or oligomerized, wherein the pre-conditioning solvent for the catalytic composition principally comprises isohexenes.

Claim 15: A process according to claim 12, wherein the pre-conditioning is conducted with stirring under an inert atmosphere at 0°C to 80°C for 1 minute to 5 hours, and the catalyst is then transferred to a reactor under an inert atmosphere.

Claim 16: A process according to claim 12, wherein the preconditioning is conducted with stirring under an inert atmosphere at 10° to 60° for 5 minutes to 1 hour, and the catalyst is then transferred to a reactor under an inert atmosphere.

Claim 17: A catalyst composition according to claim 3, wherein the halogenocarboxylic acid has a total of 2 to 20 carbon atoms and contains at least one halogen atom alpha to the -COOH group.

Claim 18: A catalyst composition according to claim 1, being devoid of ethylene, propylene and butene.

Claim 19: A catalytic composition according to claim 18, wherein pre-conditioning comprises mixing the three constituents in a hydrocarbon or halogeno-hydrocarbon solvent with stirring and in an inert atmosphere at a controlled temperature of 0°C to 80°C and for a duration of 1 minute to 5 hours.

Claim 20: A catalyst composition according to claim 19, wherein the pre-conditioning solvent comprises isohexenes.

Claim 21: A catalyst composition comprising (a) at least one divalent nickel compound of the formula $(R_1COO)_2Ni$, wherein R_1 is alkyl, cycloalkyl, alkenyl, aryl, aralkyl or alkaryl of up to 20 carbon atoms; (b) at least one hydrocarbylaluminum dihalide of the formula $AlRX_2$, wherein R is hydrocarbyl of 1 to 12 carbon atoms and X is chlorine or bromine; and (c) at least one Bronsted acid; said composition being preconditioned in a solvent.